What is claimed is:

CLAIMS

1. An optical manipulation system comprising an array of focusing elements, each of which focuses an electromagnetic energy beam from an array of beamlet sources into an array of focal spots in order to manipulate a plurality of samples on an adjacent substrate.

2. The optical manipulation system as claimed in claim 1, wherein said array of beamlet sources includes an array of micromirrors.

3. The optical manipulation system as claimed in claim 1, wherein said array of focusing elements includes an array of diffractive elements.

4. The optical manipulation system as claimed in claim 1, wherein said array of beamlet sources includes an array of light emitting diodes.

5. The optical manipulation system as claimed in claim 1, wherein said array of beamlet sources includes an array of semiconductor lasers.

6. The optical manipulation system as claimed in claim 1, wherein said array of beamlet sources includes an array of vertical cavity surface emitting lasers.

7. The optical manipulation system as claimed in claim 1, wherein said array of beamlet sources includes a spatial light modulator.

8. The optical manipulation system as claimed in claim 1, wherein said array of focusing elements includes an array of Fresnel lenses.

9. The optical manipulation system as claimed in claim 1, wherein said array of focusing elements includes an array of zone plates.

10. The optical manipulation system as claimed in claim 1, wherein said system further includes an array of microlenses interposed between said array of sources and said array of focusing elements.

11. A parallel optical manipulation system comprising an array of focusing elements, and an array of sources, wherein each source is positioned to selectively direct electromagnetic energy toward a focusing element, and each focusing element is positioned to direct a focused beam toward a particle to be manipulated.

12. A parallel optical manipulation system comprising an array of focusing elements, and an array of directionally selective elements, wherein each directionally selective element is positioned to selectively direct electromagnetic energy toward a focusing element, and each focusing element is positioned to direct a focused beam toward a particle to be manipulated.

13. The parallel optical manipulation system as claimed in claim 12, wherein said array of directionally selective elements includes an array of micromirrors.

14. The parallel optical manipulation system as claimed in claim 12, wherein said array of directionally selective elements includes an array of spatial light modulators.

15. The parallel optical manipulation system as claimed in claim 12, wherein said system further includes a single source of electromagnetic energy that is directed toward said array of

directionally selective elements.

16. The parallel optical manipulation system as claimed in claim 12, wherein said directionally selective elements may each be used to selectively switch on and off said electromagnetic energy that is directed toward a respective focusing element.

17. The parallel optical manipulation system as claimed in claim 12, wherein said directionally selective elements are each associated with a focusing element, and said directionally selective elements may each be used to selectively move with respect to an associated focusing element, said electromagnetic energy that is directed toward the associated focusing element.

18. A parallel optical manipulation system for manipulating particles using electromagnetic energy, said system comprising an array of focusing elements and an array of micro-mirrors each of which is associated with a focusing element and may be moved with respect to the associated focusing element to selectively direct a beamlet of electromagnetic energy toward a plurality of selectable locations on said focusing element.

19. A method of manipulating particles using electromagnetic energy, said method comprising the steps of:

providing an array of beamlets that are directed toward an array of focusing elements;

focusing each of said beamlets toward a plurality of particles; and

selectively controlling each of said beamlets to manipulate said plurality of particles.

20. The method as claimed in claim 19, wherein said step of providing an array of sources to provide said array of beamlets.

21. The method as claimed in claim 19, wherein said step of providing an array of directionally selectively elements to provide said array of beamlets.

22. The method as claimed in claim 21, wherein said directionally selective element includes an array of micromirrors.

23. A method of manipulating particles using electromagnetic energy, said method comprising the steps of:

providing an array of micro-mirrors that receive an electromagnetic field and provide an array of beamlets that are directed toward an array of focusing elements;

focusing each of said beamlets toward a plurality of particles; and

selectively controlling each of said micromirrors to manipulate said plurality of particles.

24. The method as claimed in claim 23, wherein said step of selectively controlling each of said micromirrors to manipulate said plurality of particles involves stretching an element that includes at least two particles.